



## The Effect of Wireworm *Agriotes* spp. in Many Types of Potatoes

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### Abstract

The present study demonstrate the infection (injury and damage) of wireworm on potato crop in spring and autumn season. This study was conducted in Abu- Greeb fields in Baghdad– Iraq during 2009 – 2010 In order to assessment the damage caused by wireworm *Agriotes* spp. on four type of growing *Solanum tuberosum* crop (Rodeo, Lotona, Bleni, Deseri) in spring and autumn season. The results of this study showed that *Agriotes* spp. was more damage in spring season more than autumn season. Percentage of the numbers of damage potato tuber to the four types was 1.81, 4.87, 6.66, 8.33 % respectively. While it was 6.55, 3.63, 10.52, 9.09 % total weight of Rodeo, Lotona, Bleni, Deseri , respectively. The Rodeo type was more injury in spring season with ratio of 11 tuber number. The result showed that the potato was damage in spring season more than autumn season and this may be due to the presence of the larvae near soil surface that liege with temperature during season. Also may be due to size of potato tuber which cultured large tuber with wide surface area be more damaged and injury.

**Keywords:** *Agriotes* spp., potato tuber damage, wireworm.

## تأثير الديدان السلكية *Agriotes* spp. في اصناف متعددة من محصول البطاطا

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### الخلاصة

اجريت هذه الدراسة في منطقة ابو غريب /بغداد/العراق خلال فترة 2009-2010 لغرض تحديد الاضرار الناتجة في اربعة اصناف من البطاطا (Rodeo, Lotona, Bleni, Deseri) نتيجة الاصابة بالديدان السلكية *Agriotes* spp. خلال موسمي الربيع والخريف .

اظهرت الدراسة ان الديدان السلكية كانت اكثر ضررا خلال موسم الربيع مقارنة مع موسم الخريف حيث ان النسبة المئوية لاعداد الدرنات المصابة كان 1.81, 4.87, 6.66, 8.33 % ، بينما النسبة المئوية للاوزان الكلية كان 6.55, 3.63, 10.52, 9.09 % للاصناف الاربعة. الصنف Rodeo اكثر اصابة بالديدان السلكية خلال موسم الربيع مقارنة بالاصناف الاخرى حيث كان معدل عدد الدرنات المصابة يساوي 11 . يلاحظ من النتائج ان الاصابة في موسم الربيع اكثر من الاصابة في موسم الخريف قد يعود السبب في ذلك الى اختلاف درجات الحرارة حيث تتواجد البرقات قرب سطح التربة في موسم الربيع اكثر من تواجدها في موسم الخريف ، وقد يعود السبب الى اختلاف حجم الدرنات المزروعة حيث ان زيادة المساحة السطحية للدرنات يزيد من نسبة الاصابة .

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## Introduction

Wireworm is a common name of the larvae of *Agriotes* spp. family Elateridae, order Coleoptera, Also. It called snappers, skipjoke, and click beetles. It is a pest of many different crops all around the world. The genus *Agriotes* spp. is very dangerous for plants and have economic important in agriculture potato in many countries [1, 2]. larva for some genus *Agriotes* spp. including *A.lineatus* , *A.obscurus*, *A.sputator*, *A. moncus*, caused damage for potato crop in north America.

Kwon et al. [3] when they cultivate 50 types of potato crop found average damage difference between 20-22%, to some type and the other types of potato crop from 80-96% . Lagas et al. [4] found loss the weight of watermelon and tomato in percent 50%, in grape 75% but corn was 100%. The organic phosphates were used to treat the seeds before planting to decrease the damage. Large amount of pesticide are needed to activated and then decrease the benefit for uses little amount for this pesticide which is not benefit to decrease the damage. Others pointed out [5] to the plant divided into group according to allergic to damaged level that caused by warm elateridae so the group with low contain of TGA (Total Glycol Alkaloid) consider very effected to

Damage with *Agriotes obscurus*, the experiment *in vitro* showed that TGA is the main factor for feeding.

Wireworm feeding on seeds caused failed of growth because the feeding on seed embryo or small root or any part of plants prevent water and food reached to plants then it will be die [3]. Also, the damage percent was 63% in types of potato Maris Peer, Marfona and Rooster, camper with another types of potato like Nadine, King Eduard, Maris Piper the percent of damage was 15% respectively [6].

In Iraq [7] indicated that wireworm harmful to potato for three fields in Baghdad, Radwanya. The damaged in spring harvest was more than the autumn harvest and the percentage of damage in the potato crop were 37 and 18.52% for all potato tuber number and 50.60% from total weight in spring and autumns harvest. The aim of this study was to determine the damage and injury which caused with wireworm in different condition of two season.

## Material and Methods

Four random samples were taken for potato tuber (Desiree, Blieni, Latona, Rodeo) from infected field with wireworms in Abu Greeb in Baghdad-Iraq during spring and autumn season of 2011-2012. Three samples were taken in each season harvest. There were 50 sections; every section length was between 8-10m. Three samples of plant where taken from each section.

The weight of potato tuber was recorded, the infected and non-infected was isolated, then anatomy the infected potato tuber to record the pore caused by wireworms that length of pore determine the injury and damage which was measured according to America legal since 1972. [8]. Define injury that is any pore produced as feeding wireworms. The damage was measured and determined the relation between the weight of potato tuber and damage degree resulted with feeding wireworms. The total length was 3.2cm and the weight was 170 g [9, 10]. According to this measured, the damage degree is the percent between length and weight.

Then the potato tubers were divided according to the weight that help to determine the damage degree [9, 10]. Then the hundred percentages between the infected potatoes tubers was accounted but not reach to damage and infected potato tuber.

The vernier tool was used (micro ruler) to measure the diameter the length of the pore for all potato tuber and determined the accumulation length for pores by summation the all pores to find the relation between the weight and average length for pores produced by wireworm in any infected samples for all field then determined the damage potato tuber. The data were merged for four types to study the differences in character for numbers and pores length causes damage. And to reach to minimum and maximum trust limited in level 0.95.in order to determin the damage potato tubers without cutting any of them.

## Result and Discussion

results showed in Tables -(1and2), the percentage of damage and injury in four types of potato tubers (Belini, Deseri ,Rodea , Latona ), Which were (12 ,8 , 13 ,11) in spring season respectively, and (13, 11, 16, 12) tuber in autumn season

Total weight to every type of affected potato tubers were (362, 275, 495, 695) g. in spring season with percent 24.42, 22.91, 31.93, 48.09% respectively. While in autumn season the number of

affected potato tubers were (410, 390, 530, 730) g. with percent (24.93, 27.23, 31.83, 40.55) % respectively.

It generally explains the amount of economic losses that caused with *Agriotes* spp. for multi-type of potato crop were in both spring and autumn season, and this percent showed the important of *Agriotes* spp. was in spring season more than autumn season in which all numbers of damaged potato tubers to the four type (2,4,6,4) (tubers 1,2,3,4), respectively. Constitutively, the numbers (6.55, 3.63, 10.52, 9.09) %, (1.81, 4.87, 6.66, 8.33) % was considered as percent of total weight.

The reason of this data may be return to the ecological and biological factors, which available congeniality condition to larva whence ability to exist during period of potato crop in spring season with more degree than autumn season, especially with high temperature, the great role in influence on coexistent the larva in different deep in the soil that agree with [4] who noted that steepest damaged caused by *Agriotes* larva in spring season usually when larva found near surface of soil. This results also agree with [11, 12] who said that the distribution of *Agriotes* larva depend on soil temperature during spring, winter, autumn season in Italia.

Also, the result in Table-2 inducted that the number and weight for potato tubers in spring season were more than in autumn season. and that agree with [7]. Also, the result in Table- 1 showed that type Deseri was more affected during spring and autumn season than other type of potato in percent 48.07, 40.55 % , respectively. Percent of injury potato tubers increase with the increasing of weight and that maybe return to increase the surface of potato tubers which mad them more susceptible to attack with *Agriotes* larva as well as the tubers with large weight that form since beginning season increase preferred to attack with larva. agree with [9, 13] who said that the percent of injury potato tubers from each weight increased with increasing potato tubers weight that return to increase the surface of potato tubers. Also, They noted that high weight in testing sample was less in number of all weight compare with other weight in the weighting.

In compare between types of potato found that Rodeo type was mid affected with 12 tubers compare with 8 tubers to Latona in autumn season, while there were no different in tubers for other type.

Data showed significant different between Belini and Latona types in spring season in ratio of affected tubers were 13, 8 tubers respectively. And found injury tubers of potato were beyond to Belini type with ratio 10 of injury potato tubers [14]. Rodeo type was more injury in spring season with ratio 11 of tubers number. Damaged potato tubers were in spring season mostly for Belini type in 6 tubers and 3 tubers in autumn season [15]. There was a significant different between Latona, Belini in spring season. We note that all types were damaged in spring season more than autumn season that return to found larva near the soil surface in that period according to [4, 16].

**Table 1-** Compare between the number, total weight and ratio of checking, injury and damage potato tuber which caused by *Agriotes* spp. in autumn season during 2009-2010.

Type of potato	Checking tuber potato		Infection tuber potato				Injury tuber potato				Damage tuber potato			
	Number of potato	Total weight	Number of potato	%	Total weight	%	Number of potato	%	Total weight	%	Number of potato	%	Total weight	%
Deseri	44	1800	12	27.27	730	40.55	8	18.18	510	28.33	4	9.09	220	12.22
Bleni	57	1665	16	28.07	530	31.83	10	17.54	385	23.12	6	10.52	145	8.70
Latona	55	1432	11	20	390	27.23	9	16.36	294	20.53	2	3.63	96	6.70
Rodeo	61	1644	13	21.31	410	24.93	9	14.75	284	17.27	4	6.55	126	7.66
LSD	8.36	153.32	3.67	-	60.14	-	1.812	-	-	-	3.52	-	-	2.932

**Table 2-**Compare between the number, total weight and ratio of checking, injury and damage potato tuber which caused by *Agriotes* spp. in spring season during 2009-2010.

Type of potato	Checking tuber potato		Infection tuber potato				Injury tuber potato				Damage tuber potato			
	Number of potato	Total weight	Number of potato	%	Total weight	%	Number of potato	%	Total weight	%	Number of potato	%	Total weight	%
Deseri	36	1445	11	30.55	695	48.09	8	22.2	530	36.67	3	8.33	165	11.41
Bleni	45	1550	13	28.88	495	31.93	10	22.22	372	24.19	3	6.66	123	7.93
Ladona	41	1200	8	19.51	275	22.91	6	14.63	210	17.5	2	4.87	65	5.41
Rodeo	55	1482	12	21.81	362	24.42	11	20	335	22.60	1	1.81	27	1.82
LSD	7.93	132.96	5.32				4.65		1.80		0.98		56.702	

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